

PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2012 Fisheries Management Survey Report

Mill Creek Reservoir

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TABLE OF CONTENTS

Survey and Management Summary	2
Introduction	3
Reservoir Description	3
Angler Access	3
Management History.....	3
Methods	4
Results and Discussion	4
Fisheries Management Plan	6
Literature Cited.....	8
Figures and tables.....	9-16
Reservoir Characteristics (Table 1)	9
Boat Ramp Characteristics (Table 2).....	9
Harvest Regulations (Table 3).....	9
Stocking History (Table 4)	10
Structural Habitat Survey (Table 5).....	11
Aquatic Vegetation Survey (Table 6)	11
Gizzard Shad (Figure 1)	12
Bluegill (Figure 2).....	13
Redear Sunfish (Figure 3)	14
Largemouth Bass (Figures 4-5; Table 7)	15
Proposed sampling schedule (Table 8).....	18
Appendix A	
Catch Rates for all Species from all Gear Types.....	19
Appendix B	
Map of 2012-2013 Sampling Locations.....	20

SURVEY AND MANAGEMENT SUMMARY

Fish populations in Mill Creek Reservoir were surveyed in 2012 using electrofishing and in 2013 using gill netting. Aquatic vegetation and habitat surveys were conducted on Mill Creek Reservoir during August 2012. An additional electrofishing survey was conducted in fall 2010 to monitor largemouth bass. Historical data are presented with the 2012-2013 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Mill Creek Reservoir is a 237-acre impoundment located in Van Zandt County, Texas, on Mill Creek, a tributary of the Sabine River. The reservoir was constructed by the City of Canton in 1976 for municipal water supply. At conservation elevation, most of the available habitat in the reservoir consists of emergent aquatic vegetation, which occurs along much of the shoreline. In recent surveys, native submerged vegetation has been scarce.
- **Management History:** Largemouth Bass and crappies are the most important sport fishes. The management plan from the 2008 survey report recommended conducting routine monitoring of the Largemouth Bass population and sampling ShareLunker offspring stocked in 2005 and 2007 as part of Operation World Record. The lack of habitat in the reservoir has been identified as a topic of concern.
- **Fish Community**
 - **Prey species:** The prey fish community of Mill Creek Reservoir is dominated by Bluegill and Redear Sunfish. Other sunfish species are less abundant. Electrofishing CPUE of Bluegill was high, with most fish measuring less than 5 inches in length. Redear Sunfish were also abundant, with some greater than 6 inches observed. Threadfin Shad were more abundant than Gizzard Shad, and few of the latter were of an appropriate size for predators.
 - **Catfishes:** No Channel or Blue Catfish were collected in the spring 2013 gill netting survey. A few large Blue Catfish were captured in 2005, the last year when either species was collected. These species are suffering from poor recruitment, likely the result of predation by Largemouth Bass.
 - **Largemouth Bass:** Largemouth Bass were moderately abundant, but reduced numbers of fish were collected in the protective 14- to 21-inch slot length limit. Body condition of Largemouth Bass tended to be good, indicating an adequate supply of prey.
 - **Crappies:** Catches of both White and Black Crappie have been documented in trap net catches in previous surveys but optional sampling was not conducted as a result of past variability of catches and labor constraints.

Management Strategies: Conduct fall electrofishing surveys on a biennial basis to monitor the Largemouth Bass population and schedule an optional trap net survey in 2016 to monitor crappie populations. Gill netting will be discontinued since no fish have been collected in the past two surveys. Continue access and vegetation surveys in 2016. A roving creel survey is proposed for spring 2016 to monitor angler effort, catch, and harvest rates. Work will commence with the City of Canton and interested volunteers to make habitat improvements by introducing native aquatic plants and fish attractors.

INTRODUCTION

This document is a summary of fisheries data collected from Mill Creek Reservoir from June 2012 through May 2013. The purpose of this document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2012 and 2013 data for comparison.

Reservoir Description

Mill Creek Reservoir is a 237-acre impoundment constructed in 1976 on Mill Creek, a tributary of the Sabine River. The reservoir is located in Van Zandt County approximately 34 miles west of Tyler, Texas, and is operated and controlled by the City of Canton. The reservoir is used as a municipal water supply by the City of Canton. Habitat at time of sampling consisted of natural shoreline with insignificant amounts of vegetative cover as water level was estimated to be approximately 2.5 feet below conservation pool elevation (cpe). Other descriptive characteristics for Mill Creek Reservoir are in Table 1.

Angler access

Mill Creek Reservoir has one public boat ramp and no private boat ramps. Boaters using the ramp are required to obtain a launch permit from the Canton Police Department. Additional boat ramp characteristics are in Table 2. Shoreline access is limited to the public boat ramp areas, along the city park and the fishing pier.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Jubar and Storey 2009) included:

1. Monitor the Largemouth Bass population, and evaluate growth of ShareLunker offspring stocked in fall 2005 and 2007 as part of the Operation World Record (OWR) research project.
Action: Mill Creek Reservoir was sampled using electrofishing in fall 2010 and 2012. Specimens were collected in fall 2012 for genetic assessment and age and growth analysis. Staff assisted with OWR electrofishing sampling in April 2009 but subsequent collections were suspended due to low rates of recapture.
2. Enhance structural habitat in Mill Creek Reservoir by installing fish attractors to influence growth rates, reproduction and recruitment of sport fishes.
Action: The project was discussed by District staff in summer 2012 following an assessment of the bathymetry of the lake. Cooperative partners will be sought to assist with underwriting the project along with construction and deployment.
3. Increase diversity of aquatic vegetation by introducing native species to provide additional fish habitat in Mill Creek Reservoir.
Action: A proposal to initiate establishment of native plants was discussed with City Manager, Lonny Cluck, in fall 2012 and approval was granted to proceed.

Harvest regulation history: Sport fishes in Mill Creek Reservoir continue to be managed under statewide regulations with the exception of Largemouth Bass, which are managed using a 14- to 21-inch protective slot length limit and a five-fish daily bag limit; of which only one fish of 21 inches or longer may be retained (Table 2).

Stocking history: Florida Largemouth Bass (FLMB) were initially introduced in 1976 (26,400 fingerlings) and stocked six more times between 1978 and 1999. Two special stockings of advanced-fingerling (6 inches) ShareLunker offspring (from the Operation World Record project) were introduced in fall 2005 and 2007. In 2010, a donation of 17,950 FLMB fingerlings was received from a private hatchery. Blue catfish were stocked in 1992 and Channel Catfish in 1978, 1991 and 1993. Threadfin shad were introduced in 1982 and 1983. In 1976, 9,000 Northern Pike x Muskellunge hybrids (aka Tiger Muskies) were introduced but the stocking failed to establish a fishery. The complete stocking history is in Table 4.

Vegetation/habitat history: As recently as 2004, Mill Creek Reservoir contained a substantial amount of native submersed vegetation, representing 43% of reservoir surface area (Storey and Jubar 2005). Following extended droughts (2005-2006 and 2010-2011) when reservoir water elevations were markedly reduced, submersed vegetation declined and has not recovered.

Water transfer: Mill Creek Reservoir is a water supply for the City of Canton and no inter-basin transfers exist.

METHODS

Fishes were collected by electrofishing in fall 2010 and 2012 (1 hour at 12, 5-min stations), and gill netting in spring 2013 (5 net nights at 5 stations). Electrofishing in 2010 was for Largemouth Bass only. Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing, and for gill nets as the number of fish caught per net night (fish/nn). All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (Texas Parks and Wildlife Department (TPWD), Inland Fisheries Division, unpublished manual revised 2011). Aquatic vegetation and littoral habitat surveys were performed according to the Fishery Assessment Procedures TPWD, Inland Fisheries Division, unpublished manual revised 2011). Shoreline distances and areas of vegetation were estimated using ArcView GIS software.

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight (W_t)] were calculated for target fishes according to Anderson and Neumann (1996). Index of Vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error ($RSE = 100 \times SE \text{ of the estimate} / \text{estimate}$) was calculated for all CPUEs. Ages were determined for Largemouth Bass using otoliths from 13 specimens, with lengths ranging from 13.2 to 14.7 inches, collected by electrofishing in October 2012.

Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Micro-satellite DNA analysis was used to determine genetic composition of 29 individual fish from fall 2012.

No gauging station exists on Mill Creek Reservoir, and reported elevations were based on estimates made during sampling.

RESULTS AND DISCUSSION

Vegetation/habitat: Water elevation was estimated to be 2.5 feet below cpe at the time of the habitat and vegetation surveys, and little available aquatic habitat existed. Shorelines were undeveloped (Table 5). A trace of American lotus and 0.8 acres (0.3% of the reservoir surface area) of alligatorweed were observed (Table 6). No hydrilla was observed during the 2012 survey. All aquatic vegetation in Mill Creek Reservoir has decreased in abundance since 2004 likely the result of extended droughts in 2005-2006 and 2010-2011 (Table 6).

Prey species: Prey populations in Mill Creek Reservoir were dominated by sunfishes, mostly Bluegill and Redear Sunfish (Appendix A), despite limited aquatic vegetation. Electrofishing CPUE of Bluegill was high (583.0/h), most measuring less than 5 inches in length (Figure 2). Total CPUE was higher than in 2004 (87.0/hr) or 2008 (320.0/hr). Redear Sunfish were also more abundant in 2012 (330.0/h) than in any other year in the review (Figure 3). Few were longer than 6 inches. Total electrofishing CPUE of Gizzard Shad has been historically low, with few (20%) fish suitably sized as prey (Figure 1). In 2012, threadfin shad were considerably more abundant (761.0/h) than Gizzard Shad (90.0/h) (Appendix A).

Catfishes: Historically, gill net CPUE of Blue and Channel Catfish have been low, likely from Largemouth Bass predation. No Channel or Blue Catfish were collected in the spring 2013 gill netting survey. The most recent year either species was collected was 2005, when a few large Blue Catfish were captured. These fish were likely remnants from a 1992 stocking of adult fish.

Largemouth bass: Largemouth Bass continued to be moderately abundant, evidenced by the 2012 electrofishing survey, and despite poor sampling conditions due to low water levels. Total CPUE in fall electrofishing was similar in 2012 (81.0/h) to 2010 (83.0/h) and 2008 (70/h) (Figure 4). Despite the similarity in relative abundance, size distribution has varied. Sub-stock fish (<8 inches) represented 26% of the sample in 2012 as compared with 39% in 2010 and 40% in 2008. The abundance of fish within the protective slot-length limit (14-21 inches) as a percentage of all stock-sized fish (>8 inches) was also lower in 2012 (17%) than in 2010 (47%) or 2008 (36%). Body condition was moderate for all size classes of fish (range 85 – 99), indicating an ample supply of prey. Growth in fall 2012 was moderately fast, with fish ages averaging 2.2 years (N = 13; range = 2 – 5 years) at 14.0 inches (13.2 to 14.7 inches). Genetic analyses indicated 3% pure FLMB and 97% second or higher generation hybrids between a FLMB and a NLMB (Fx). The FLMB allele frequency in 2012 (58%) was similar to the previous assessment performed in 2008 (52%).

Crappie: Catches of both White and Black Crappie have been documented in trap nets in previous surveys but sampling was not conducted because of variability in CPUEs and labor constraints.

Fisheries management plan for Mill Creek Reservoir, Texas

Prepared – July 2013

ISSUE 1: Mill Creek Reservoir has a history of producing trophy Largemouth Bass. The lake record, a 16.77-pound fish caught in 1990, is the 10th heaviest Largemouth bass ever caught in Texas. The lake has produced four TPWD ShareLunker entries, most recently in February 2006. In 1998, 168 surplus hatchery FLMB-broodstock were stocked. Advanced-fingerling ShareLunker offspring were stocked in 2005 and 2007 as part of the Operation World Record research project. The most recent FLMB stocking took place in 2010 as the result of a donation of fingerlings from a private hatchery. Genetic assessment conducted in 2012 yielded 3% pure FLMB and 97% second or higher generation hybrids (Fx) between FLMB and Northern Largemouth Bass (NLMB), and the FLMB allele frequency was 58%.

MANAGEMENT STRATEGIES

1. Monitor Largemouth Bass relative abundance, condition, and population size structure by conducting electrofishing surveys every other year beginning in 2014.
2. Continue to monitor FLMB allele frequency through collection of fin samples every four years.
3. Recommend stocking FLMB fingerlings at 100/acre in 2015 and 2016 after native vegetation enhancement (which will begin in 2013) has had an opportunity to improve the aquatic habitat.
4. Conduct roving creel survey from March through May 2016 to monitor angler effort, catch, and harvest rates of largemouth bass.

ISSUE 2 Structural habitat and aquatic vegetation are limited in Mill Creek Reservoir. Enhancement projects may improve recruitment of sport fishes, as well as increase angling success. Efforts on other reservoirs within District 3B to establish native vegetation and add structural habitat have proven successful, and these techniques should be applied in Mill Creek Reservoir.

MANAGEMENT STRATEGIES

1. Coordinate enhancement projects in advance with the City Manager of Canton.
2. Seek local interest groups willing to assist with activities involved with procurement, transportation, and distribution of native aquatic vegetation and fish attractors.
3. Increase the diversity of aquatic vegetation by introducing native plants to provide additional fish habitat. Initial efforts will involve the use of emergent types resistant to herbivory such as waterwillow and buttonbush. In subsequent years, submersed species planted in protective herbivore exclosures such as American pondweed, Illinois pondweed, waterstargrass, and wild celery will be deployed.
4. Conduct bathymetric survey of Mill Creek Reservoir using sonar to identify sites most suitable for location of fish attractors.
5. Construct fish attractors using bamboo as it is light to work with, offers an inexpensive option for constructing fish attractors, provides increased vertical structure and is allegedly more resistant to decay than other commonly-used natural materials.

ISSUE 3: In previous years, crappie CPUEs in trap netting at Mill Creek Reservoir have exhibited large fluctuations indicative of erratic recruitment patterns, inefficient sampling methodology, or a combination of factors. In 2000 the catch rates of White Crappie (31.0/nn) and Black Crappie (109.8/nn) were high yet the individual populations exhibited high fisheries quality (RSD-P; White Crappie:52, Black Crappie:62). By 2004 combined

CPUE was 5.4/nn (White Crappie: 0.8/nn, Black Crappie: 4.6/nn) and in 2008 it increased to 10.2/nn (White Crappie: 1.0/nn, Black Crappie: 10.2/nn). Sampling was not conducted in 2012 because of labor constraints. The fishery is popular with anglers and so it needs to be sampled during the next scheduled review cycle.

MANAGEMENT STRATEGIES

1. Conduct optional fall trap netting survey to assess crappie populations in 2016.
2. Collect age and growth samples from White Crappie and Black Crappie in 2016.
3. Assess angler effort, catch, and harvest rates of crappie fishery through roving creel survey from March through May 2016.

ISSUE 4: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Educate the public about invasive species through the use of media and the Internet.
3. Make a speaking point about invasive species when presenting to constituent and user groups.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes electrofishing in 2014 and 2016, and optional trap netting in 2016 (Table 8). A roving creel survey will be conducted in spring (March through May) 2017 to monitor angler effort, catch, and harvest rates. Access and aquatic vegetation surveys will be conducted in 2016. Gill net surveys will be discontinued because of low abundances of Blue Catfish and Channel Catfish and absence of temperate basses (e.g. Striped Bass, White Bass, and Palmetto Bass).

LITERATURE CITED

- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
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- Storey, K.W., and A.A. Jubar, 2005. Statewide freshwater fisheries monitoring and management program survey report for Mill Creek Reservoir, 2004. Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Performance Report, Project F-30-R-30, Job A, 24 pages.

Table 1. Characteristics of Mill Creek Reservoir, Texas.

Characteristic	Description
Year constructed	1976
Controlling authority	City of Canton
Surface area	237 acres
Counties	Van Zandt
Reservoir type	Off-Stream type
Mean depth	10.0 ft.
Maximum depth	25.0 ft.
Shoreline Development Index (SDI)	3.5
Conductivity	75 μ mho / cm
Secchi disc range	1 – 4 ft.

Table 2. Boat ramp characteristics for Mill Creek Reservoir, Texas, August, 2012. Reservoir elevation at time of survey was 2.5 feet below conservation pool elevation.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Condition
Lakeside Marina	32.53693 -95.85003	Y	15	City of Canton repaved parking lot during review period. Grade of boat ramp is very shallow.

Table 3. Harvest regulations for Mill Creek Reservoir.

Species	Bag limit	Length limit (inches)
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish: Flathead	5	18-inch minimum
Bass: Largemouth	5 (1 fish 21 inches or longer)	14 – 21 slot length limit
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Mill Creek Reservoir, Texas. Size categories are: FRY =<1 inch; FGL = 1-3 inches; AFGL = 8 inches, and ADL = adults.

Year	Number	Size
<u>Threadfin Shad</u>		
1982	4,000	ADL
<u>1983</u>	<u>1,000</u>	ADL
Species total	5,000	
<u>Northern Pike x Muskellunge</u>		
<u>1976</u>	<u>9,000</u>	FGL
Species total	9,000	
<u>Blue Catfish</u>		
<u>1992</u>	<u>577</u>	ADL
Species total	577	
<u>Channel Catfish</u>		
1978	15,500	FGL
1991	9,120	FGL
<u>1993</u>	<u>9,090</u>	FGL
Species total	33,710	
<u>Florida Largemouth Bass</u>		
1976	26,400	FGL
1978	1,085	AFGL
1980	39,845	FGL
1983	52,902	FGL
1998	168	ADL
1998	36,603	FGL
1999	36,000	FGL
2005*	5,949	AGFL
2007*	5,928	AFGL
<u>2010</u>	<u>17,950</u>	FGL
Species total	222,830	

*ShareLunker advanced fingerlings for the Operation World Record research project.

Table 5. Survey of structural habitat types, Mill Creek Reservoir, Texas, August 2012. Shoreline habitat type units are in miles. Reservoir water level was estimated to be 2.5 feet below conservation pool elevation at time of survey.

Habitat type	Estimate	% of total
Natural	7.7 miles	100.0

Table 6. Survey of aquatic vegetation, Mill Creek Reservoir, Texas, 2004, 2008, and 2012. Surface area (acres) is listed with percent of total reservoir surface area in parentheses. Reservoir water level was estimated to be 2.5 feet below conservation pool elevation at time of survey in August 2012. Individual native species observed during surveys are listed in footnotes.

Vegetation	2004	2008	2012
Native emergent	6.8 (2.9) ¹	0.5 (0.2) ³	Trace ⁵
Native submersed	102.4 (43.5) ²	0.2 (<0.1) ⁴	
Invasive			
<i>Alligatorweed</i>		2.3 (1.0)	0.8 (0.3)
<i>Hydrilla</i>	5.4 (2.3)	<0.1 (<0.1)	
Total	114.6 (48.6)	3.0 (1.3)	0.8 (0.3)

¹ American lotus, cattail, common reed, smartweed, waterprimrose

² Bushy pondweed, coontail, muskgrass

³ Bulrush, common reed, maidencane

⁴ Bushy pondweed, muskgrass

⁵ American lotus

Gizzard Shad

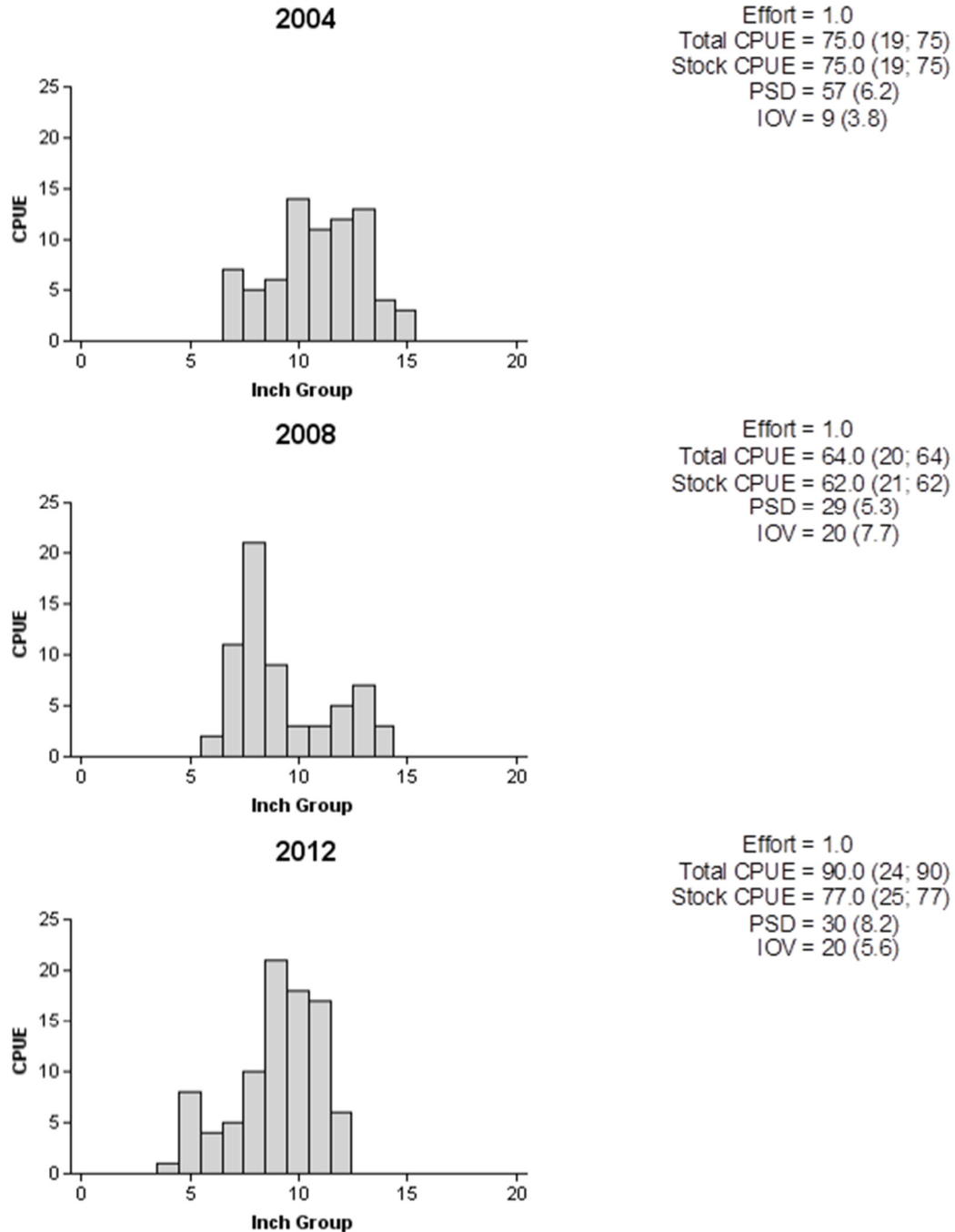


Figure 1. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Mill Creek Reservoir, Texas, 2004, 2008, and 2012.

Bluegill

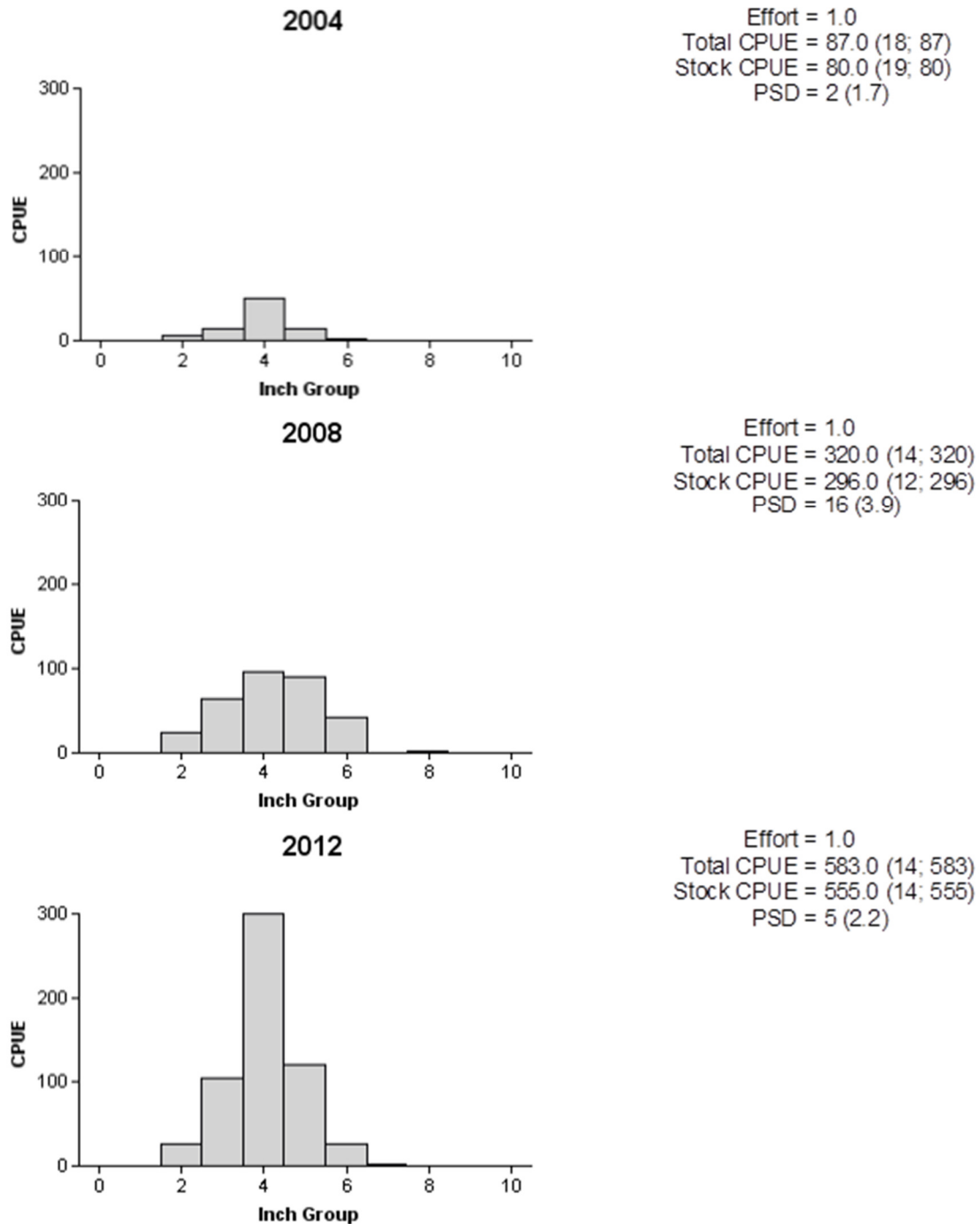


Figure 2. Number of Bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Mill Creek Reservoir, Texas, 2004, 2008, and 2012.

Redear Sunfish

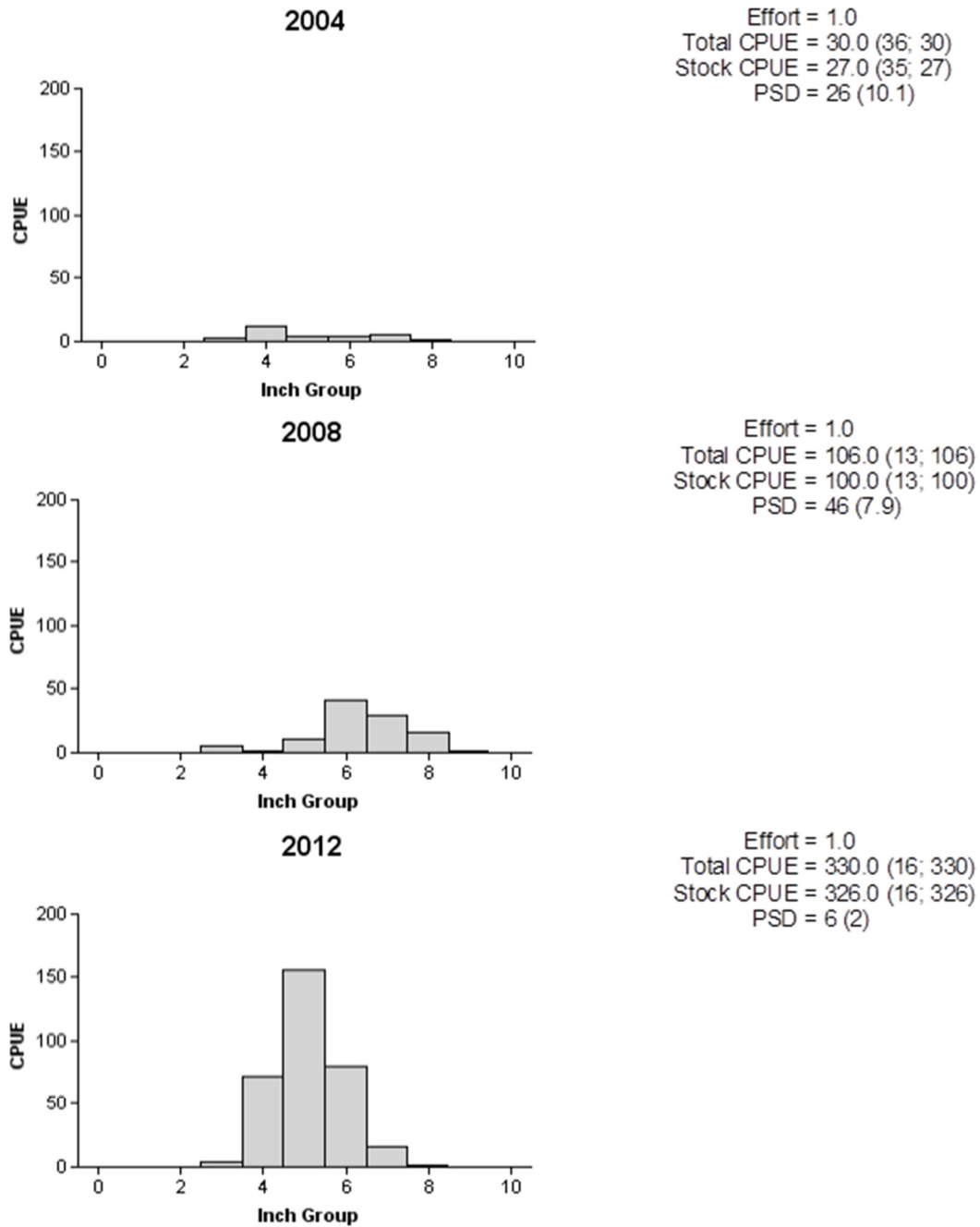


Figure 3. Number of Redear Sunfish caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Mill Creek Reservoir, Texas, 2004, 2008, and 2012.

Largemouth Bass

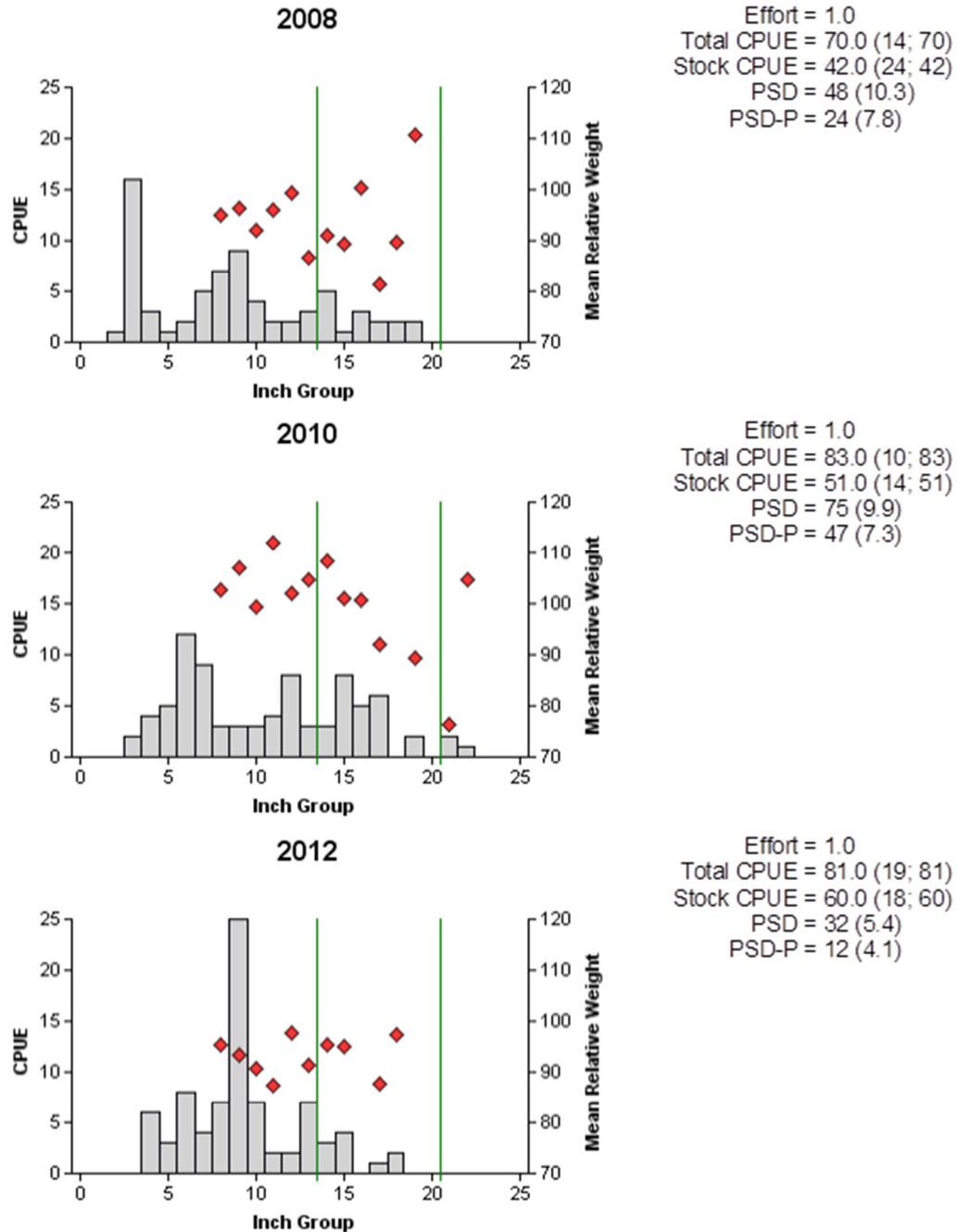


Figure 4. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Mill Creek Reservoir, Texas, 2008, 2010, and 2012. The 2010 survey was for Largemouth Bass-only. Vertical lines indicate minimum and maximum limits of protective slot at time of survey.

Table 7. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Mill Creek Reservoir, Texas, 2004, 2008, and 2012. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, F1 = first generation hybrid between an FLMB and an NLMB, Fx = second or higher generation hybrid between an FLMB and an NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

Year	Sample size	Number of fish				% FLMB alleles	% FLMB
		FLMB	F1	Fx	NLMB		
2004	18	6	4	6	2	59.7	33.3
2008	30	1	2	27	0	52.0	3.0
2012	29	1	0	28	0	58.0	3.0

Table 8. Proposed sampling schedule for Mill Creek Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing is conducted in the fall. Standard survey denoted by S, additional survey denoted by A.

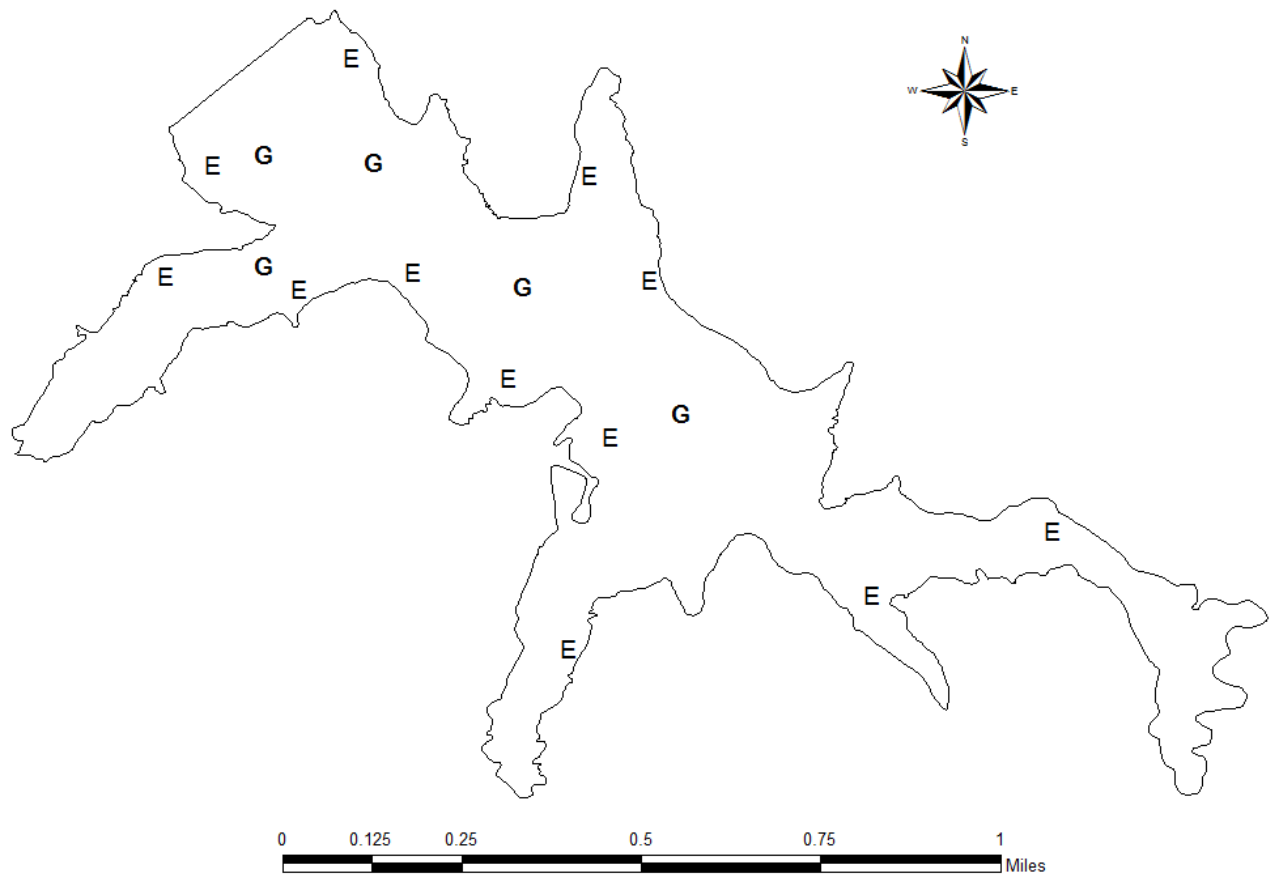
Survey year	Electrofish Fall	Trap net	Gill net	Habitat		Access	Creel survey	Report
				Structural	Vegetation			
2013-2014								
2014-2015	A							
2015-2016							A	
2016-2017	S	A			S	S		S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected by fall electrofishing from Mill Creek Reservoir, Texas, 2012-2013.

Species	Electrofishing	
	N	CPUE
Gizzard Shad	90	90.0
Threadfin Shad	761	761.0
Warmouth	11	11.0
Bluegill	583	583.0
Longear Sunfish	61	61.0
Redear Sunfish	330	330.0
Largemouth Bass	81	81.0

APPENDIX B



Location of electrofishing (E) and gill netting (G) stations, Mill Creek Reservoir, Texas, 2012-2013.